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FOREST PEST MANAGEMENT
Pacific Southwest Region

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3430 Evaluation
August 7, 1984

A BIOLOGICAL EVALUATION OF THE FOREST CREEK BURN PLANTATION, CALAVERAS RANGER DISTRICT, STANISLAUS NATIONAL FOREST

PSW FOREST AND RANGE EXPERIMENT STATION
JUN 11 1985
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ABSTRACT

The Forest Creek Burn Plantation was evaluated to assess the need for borax treatment of stumps during a scheduled pre-commercial thinning. Because 40% of the stumps examined in the plantation were infected with Fomes annosus, borax stump treatment should be considered. Alternatives presented and discussed include annosus root disease management, slash treatment, and modification of marking guidelines.

Duncan Wurm, Culturist, and Bill Baxter, Small Sales Officer, of the Calaveras Ranger District requested Forest Pest Management assistance in assessing the potential impact of annosus root disease in the Forest Creek Burn Plantation. The area is scheduled for pre-commercial thinning late this summer or early fall. The District also requested information on other current and potential pest problems that should be considered during and after stand entry. We examined portions of the plantation on July 18, 1984. Following are our observations and a discussion of management considerations applicable to the area.

OBSERVATIONS

Three hundred acres in the Forest Creek area (T. 7 N., R. 15 E., Sec. 29 and 30) burned in 1959. About 150 acres of National Forest land within the burn were planted in 1960 with ponderosa pine, some sugar pine, and in one portion, Jeffrey pine. Former tree cover was a mixed conifer forest of Douglas-fir, ponderosa pine, sugar pine, white fir and incense-cedar. Site class (Dunning) ranges from I to III.

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Although scheduled in the past, precommercial thinning has not occurred in the 24-year-old plantation. Diameters of planted trees vary, but range from about 8 inches to about 16 inches dbh. Increment cores indicate that growth has slowed considerably in the last 10 years. Basal area exceeds 300 sq.ft./acre in places. Douglas-fir, white fir, and incense-cedar have seeded in naturally in some portions.

Because Bill Baxter noted F. annosus associated with three dead ponderosa pines during his examination of one portion of the plantation (unit 4), the District needed information on the levels of F. annosus throughout the plantation, and on the implications of treating or not treating stumps with borax after entry.

Results of a random survey of stumps for signs (conks, white laminated decay) of F. annosus in three of the seven units follows:

UNIT	NO STUMPS EXAMINED	NO. STUMPS WITH ANNOSUS
2	10 (7 PP, 3 DF)	2 (2 DF)
4	10 (6 PP, 3 DF, 1 IC)	3 (2 PP, 1 DF)
5	20 (11 DF, 6 PP, 3 unk.)	11 (5 DF, 4 PP, 2 unk.)
TOTAL	40	16 = 40% with annosus

Fruiting bodies of F. annosus producing viable spores were common in the areas of the plantation surveyed. An estimated 40% of the stumps examined were infested. In all cases, planted pines or natural regeneration in the immediate vicinity of infested stumps had no above-ground symptoms of infection.

Other, relatively minor, pest problems were noted in the plantation. White pine blister rust (Cronartium ribicola) was causing lethal branch and stem infections, and pockets of rust-killed sugar pine occurred along the drainage between units 4 and 5. Western gall rust (Endocronartium harknessii) branch galls were noted on a few ponderosa pines. Gouty pitch midge (Cecidomyia piniinopis) damage occurred on ponderosa pines along the road in the area of unit 5. Western dwarf mistletoe (Arceuthobium campylopodum) was not observed within the plantation, but was infecting overstory and understory ponderosa pine east of unit 1.

MANAGEMENT ALTERNATIVES

The following management alternatives are presented for consideration by the District during and after the scheduled thinning.

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The following management alternatives are presented for consideration by the District during and after the scheduled thinning.

1. Do Nothing. This assumes that the current management direction would be continued. The actions would be to thin the plantation with no special treatment of the stumps or slash.

The available aerial spore load of F. annosus is considerable throughout the plantation. Data on the relationship between spore load and expected numbers of frequencies of future stump infection are not available. However, the availability of inoculum and the large number of stumps that will be created at Forest Creek suggest that the probability of stump infection during thinning is high. Lack of above ground symptoms in pines surrounding infested stumps is probably due to the relative host specificity of the fungus. Strains of the fungus on true fir and Douglas-fir will seldom cross over and infect adjacent pines via root contact. However, spores produced by fir strains are quite capable of infecting freshly-cut pine stumps. As a conservative estimate, the planned thinning will create over 100 stumps per acre. If, again conservatively, only one of these stumps becomes infected and the center then expands to 1/10 acre, 10% of that acre will be out of production. It is conceivable that the loss in yield, with no protective measures taken will be comparable to the site becoming, in effect, one site class lower.

Pine engravers, Ips spp. can breed in fresh slash from any species of pine which is over 3 inches diameter. If freshly cut pine bolts are piled or remain shaded for a period of 6-10 weeks, pine engraver populations can build up. The current marking in the plantations suggests that slash produced during thinning may not be exposed to direct sunlight. Although mortality caused by pine engraver outbreaks seldom exceeds 5 percent of the stems, the dead trees tend to be grouped. This can cause understocked pockets in the plantation.

2. Annosus Root Disease Management. The most effective control for annosus root disease is prevention. Colonized stumps will initiate root disease centers. Treatment of freshly-cut stump surfaces with borax (sodium tetraborate decahydrate; EPA Reg. No. 1624-94) is 90% effective in preventing colonization by F. annosus, and will, therefore, reduce future impact of this root disease. The borax is toxic to the spores of the fungus and prevents germination; it has no effect on existing infections. Directions for applying the chemical are on the label. For maximum effectiveness, it is imperative that the chemical be applied as soon after felling as practical and that it cover the entire stump surface.

Other treatments besides the use of borax can in some situations help reduce the impact of F. annosus. In general, the best time of the year to log in areas with annosus root disease would be during the hottest and driest summer months. The number of F. annosus spores in the air at this time is relatively low and stump surfaces may dry out before they are infected. Also, stumps under 8 inches in diameter, and larger stumps that are 18 inches high or higher, will usually reach temperatures lethal to F. annosus during the summer. However, the dense stocking and leave tree marking in the Forest Creek Burn Plantation

suggests that many of the stumps created will not receive sufficient sunlight to enable stump surface temperatures to reach lethal levels. In addition, the creation of high stumps would necessitate a change in the prescription for crushing of slash and would increase the total cost of the project.

3. Slash Treatment. Fresh pine slash caused by thinning can be modified in a number of ways to make it unsuitable for pine engraver breeding. One approach to minimizing damage is to schedule slash-generating activities mostly between mid-July and late December, when the slash has a high probability of drying out before the beetles can complete their development. Green pine slash created during the spring and early summer should be treated to prevent the buildup of pine engraver populations. Because pine engravers can complete their development in about a month under ideal conditions, treatment should be carried out soon after cutting to be effective. Some methods of slash treatment include lopping and scattering slash in sunny areas to speed its drying, crushing or mashing slash with logging equipment to make it unsuitable for pine engraver breeding, or piling and burning the slash within a month of cutting. Broadcast burning the slash might work if it could be done while the slash is green without damaging the residual stand. Another method which might work is to pile slash in a sunny area and tightly cover the pile with clear plastic. If the temperature under the bark of slash in all parts of the pile reaches 120°F, all brood currently in the pine will be killed. Lower temperatures will not be effective and, where successful, this method will not prevent reinfestation off slash piles. Two procedures which should be avoided at all times are piling fresh pine bolts over 3 inches diameter with no further treatment, and allowing fresh pine slash to remain in direct contact with leave trees.

4. Modify Marking Guidelines. Current leave tree marking in the plantation has resulted in dense, overstocked stands along most portions of the road. The intent of the marking was to provide a visual screen to the interior. However, the guidelines used present several potential problems.

Heavily-stocked, single species stands are susceptible to several pests, including annosus root disease and bark beetles. Leaving more of the naturally-regenerated incense-cedar, Douglas-fir and white fir would result in a mixed species stand which, in addition to providing better screening than pines, would be less susceptible to pine pests. A mixed species stand would provide a barrier to spread of F. annosus via root contacts, and would be less vulnerable to damage from future bark beetle outbreaks.

Numerous lethally infected sugar pines were marked as leave trees. These trees could be removed now to reduce basal area and to provide space for growth of the non-pine species present.